



The AFIP — 2007

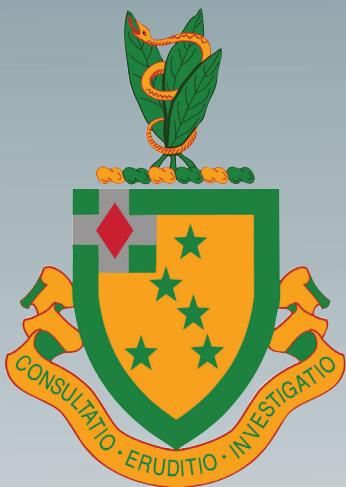
≡ A Legacy of Excellence

consultation
education
research

Armed Forces Institute of Pathology
Washington, DC

**The Armed Forces Institute of Pathology
supports the
United States Department of Defense
and serves the American people by
providing medical expertise in diagnostic
CONSULTATION, EDUCATION, and RESEARCH
to enhance the health and well being of the nation.**





The AFIP: Successful Service for the American People.

The Armed Forces Institute of Pathology is a tri-service agency of the Department of Defense dedicated to pathology consultation, education, and research. Since 1862, AFIP has worked hand in hand with the Department of Defense. With 23 subspecialty departments, 62 privileged physicians and 10 privileged PhD researchers, AFIP provides diagnostic answers to the military, academia, government institutions, and commercial markets.

At AFIP, pathology experts collaborate on medical projects of international significance. Having done this work since the Civil War, the accumulation of cases has led to the Central Repository. Containing over 7.1 million case files, the Repository is used by the worldwide medical community.

AFIP is looking to the future to continue its fine work as a pathology institution. The Central Repository is going digital, and millions of images and case records are scanned electronically making them available to pathologists all over the world. A new tissue microarray program allows a single glass slide to contain up to 1,000 specimens. A virtual library, called AskAFIP™, is becoming the new platform for pathology study. Containing streaming video, complex case files and digital slides, AskAFIP™ is continually growing with new files added monthly. New projects, such as traumatic brain injury research, allows AFIP to help America's servicemembers. The continued research by AFIP's Medical Examiner's office improves battlefield medicine and protective equipment for all servicemembers. Teaching the next generation of top pathologists, AFIP's education program just received the highest accreditation of Continuing Medical Education courses.

Keeping a hopeful outlook on the future while maintaining its status as a resourceful pathology institute, AFIP is dedicated to its mission to serve the American people.

The year 2007 was a year of invigoration for the Armed Forces Institute of Pathology (AFIP). By remaining intensely focused on the vital services we provide in the areas of pathology consultation, education, and research, we were able to maintain our status as one of the premier pathology centers in the world. Equally important were steps we took to instill new life and spirit into both the Institute's current and future operations.

2007

Director's Message

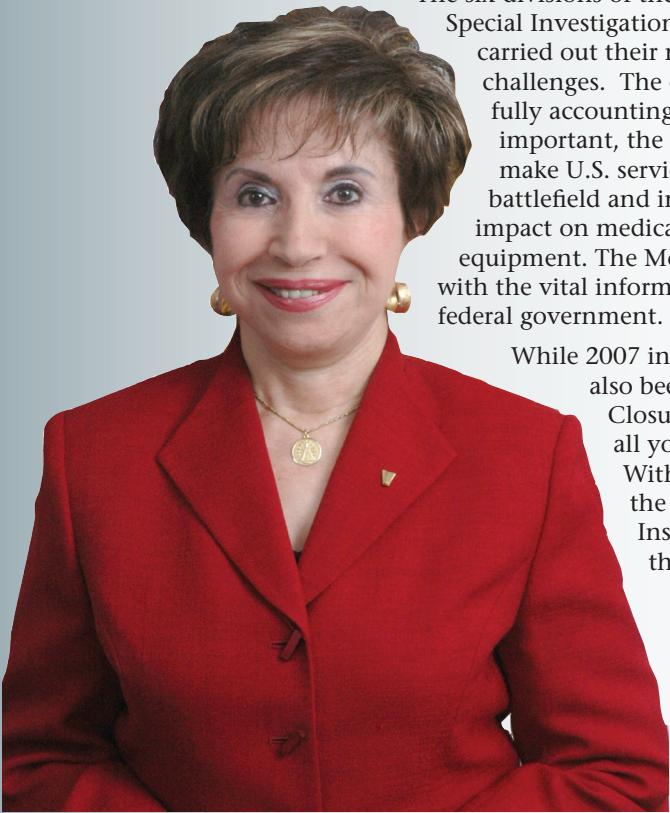
The Division of Molecular Pathology moved from the Gillette Building to AFIP Headquarters and began a significant upgrade of its laboratory. The move fully integrated the division into AFIP's consultative service, thereby improving the quality of support provided to the diagnostic and research services. The move and laboratory upgrade

directly impacts the success of the division's mission, which focuses on providing prompt test results for clinical consultation services, developing new molecular assays for the surgical pathology departments, and actively collaborating with the pathologists and other scientists involved with research using molecular techniques.

Additionally, a Clinical Initiatives Program was activated to move the science of pathology forward at a faster rate. This is a forward-leaning program that includes reaching out to the scientific community, academia, biotechnology companies, and the pharmaceutical industry to share what we're doing, learning more about what others are doing, and capitalizing on emerging trends and research to improve service to our customers. This effort will result in the development of new technologies and techniques that will help render faster, higher quality diagnoses.

The Scientific Laboratories began planning for creation of an institute-wide research and development laboratory that would capitalize on the Clinical Initiatives Program. Ideas for new procedures will come from that program, and those selected by a review committee will be acquired from commercial vendors and developed in-house and then validated and brought into the diagnostic laboratories. New prognostic markers for infectious disease are priority for development.

AFIP also began a vital study of the Tissue Repository—one of our greatest assets consisting of more than 7.1 million case files. The study will assess the integrity and robustness of five computer databases that underpin the operation of the repository, as well as conduct a complete analysis and assessment of a representative sample of blocks, slides, and tissues. This effort is key to modernization of the repository's holdings, which are available for study internationally, as well as being an integral part of AFIP's digital fascicle library and the Tissue Microarray Program.



The six divisions of the Medical Examiners System—Operations, Education and Research, Special Investigations, DNA, Toxicology, and Mortality Surveillance—successfully carried out their mission which encompasses an unprecedented workload and challenges. The entire staff should be justifiably proud of their accomplishments in fully accounting for those who have died while serving the United States. Just as important, the System has made significant contributions to the ongoing efforts to make U.S. servicemembers of today and tomorrow safer and more effective on the battlefield and in garrison. Data gathered and research undertaken has had a direct impact on medical care and the design of the next generation of personal protective equipment. The Mortality Surveillance Division continued to expand in recognition with the vital information they provide to all levels of the Department of Defense and federal government.

While 2007 indeed has been a year of invigoration, I fully understand that it has also been a year marked by uncertainty because of Base Realignment and Closure. With this in mind, please accept my sincere appreciation for all your dedication and hard work, and especially for your enthusiasm. Without such enthusiasm it would have been impossible to make the tremendous strides that made 2007 a success—not only for the Institute, but for the clients we serve—our nation's military members, their families, and our veterans.



Florabel G. Mullick, MD, ScD, FCAP
Senior Executive Service
The Director



Change in Command Means Progression for AFIP

AFIP's First Civilian Director is appointed and a shift towards the future follows.

"Sometimes I feel like I was born in this building. There is no place like AFIP in the world."

—Florabel G. Mullick, MD, ScD, FCAP
Senior Executive Service
The Director

As Florabel G. Mullick, MD gave her first address as Director of the Armed Forces Institute of Pathology, the audience could sense something was different about their new leader. But it wasn't just her red suit and charismatic manner that set her apart from those present. It was her recognition of AFIP's past accomplishments, current success, and most importantly, her vision for the future. For Florabel Mullick isn't just the new Director, she is the first civilian Director appointed at AFIP, ever. A rare accomplishment achieved by a woman whose career has spanned over 30 years of triumphs in the medical community. She is a world-recognized expert in adverse drug reactions and lectures on the subject. The International Academy of Pathology elected her Secretary in 1994 and President-Elect in 2006. And this is just the tip of the iceberg when listing Dr. Mullick's achievements. Recipient of the Meritorious Executive Service Award and the Distinguished Executive Service Award; both awards are Presidential Rank. Author or co-author of 193 publications (and counting). Pioneer in the pathology world. Professor. Trustee. Diplomat. And in October 2007, she was honored by The International Center, an organization that has previously honored Alistair Cooke and Henry Kissinger.

Now, as the first civilian Director of AFIP, Dr. Mullick is thinking ahead. AFIP is very fortunate to have not only a director who is a good leader, but one who truly loves what she does. As the audience listened to her deliver her first speech as Director, they heard what's next in store for AFIP. What does that sound like? Innovation, forward-thinking, and continued excellence. It's going to be a very exciting future.

AFIP Takes Road Less Traveled to Achieve New Goals

"We will follow the road less traveled by renewing and reinvigorating our commitment to innovation."

Under Dr. Mullick's leadership vision, AFIP is embarking on a journey towards the future and advancement in a modern age of medicine. To get there, Dr. Mullick proposed taking the 'road less traveled.' What is the road less traveled? Withstanding conformity while seeking out inventive ways to improve and adapt to change. AFIP's accomplishments in 2007 proved the institute is taking strides into the future of medicine. Here are just some of the ways AFIP is one step ahead:

- A \$1 million upgraded laboratory space with unique technology allowing for progressive research.
- A state-of-the-art virtual repository building housing thousands of digital files.
- The first ever forensic CT scanner now in use by AFIP's medical examiners.
- The Clinical Initiatives Program extending AFIP's helping hand across continents.



Florabel G. Mullick
MD, ScD, FCAP
Senior Executive Service

The Director

Charles W. Pemble, III
CoL, USAF, DC
Deputy Director, Air Force

Robert D. Foss
CAPT, DC, USN
Associate Director, Navy

Terrell W. Blanchard,
COL, VC, USA
Deputy Director, Army

Adrienne Noe, PhD
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AFIP Executive Committee



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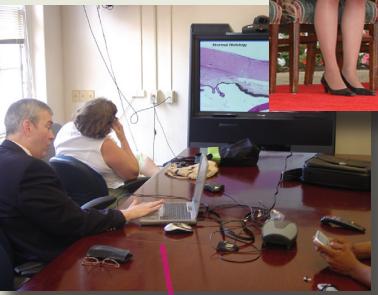
SFC Chanda L.
Sutton,
First Sergeant

James Affonco,
Chief of Staff

Catherine M. With
JD, LLM, LLM, Major,
USA
Judge Advocate
General's Corps;
Legal Counsel

AFIP Executive Committee

2007: Year of Forward Thinking—



December 2006
AFIP lab chosen
as Medical Laboratory Observer's
2006 winner.

January 2007
A one million-dollar upgrade project starts at AFIP's labs, integrating the molecular laboratory. The molecular laboratory can now perform its world-class research more efficiently.

February 2007
AFIP initiates a new tissue microarray program (TMA). This efficient program makes research material available to the medical and research community worldwide.

April 2007
AskAFIP™ 3.0 debuts with full libraries, journals, and diagnoses available online. The website becomes an incomparable resource for pathology physicians and students all across the world.

May 2007
Video teleconferences added to Grand Rounds program doubles the subscribers to the website, making educational courses more accessible.

June 2007
Florabel G. Mullick, MD, ScD, FCAP, SES, becomes the first civilian Director of AFIP.

Consultation

education

research

Consultation, Education, Research



October 2007
New Clinical Initiatives Program is launched to capitalize on technological advances in pathology. The program's goal is to develop new technologies and techniques rendering higher quality diagnoses.

October 2007
AFIP Pathologists' tumor classification expertise receives international recognition. Their proposals are submitted for adoption by the International Union Against Cancer and the American Joint Committee on Cancer.

October 2007
Florabel G. Mullick, MD, ScD, FCAP, SES, honored by The International Center whose mission is to honor highly accomplished foreign-born individuals who have made significant contributions to life in America by presenting them with an Award of Excellence.

January 2008
AFIP's website gets a new look with its new vision for the future. The site features innovative and interactive ways to explore AFIP's consultation, education, and research services.

March 2008
The Accreditation Council for Continuing Medical Education (ACCME) reaccredited the AFIP's Continuing Medical Education program for six years. The ACCME also awarded five commendations to AFIP. Only 0.08% of the many hundreds of education providers receive this honor.

July 2008
AFIP animal care program receives special recognition from the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC). The animal care program was recently selected by AAALAC to be assessed by a Council Member Emeritus—only limited to those institutions that have demonstrated high standards of animal care.

Consultation
education
research



≡Clinical Initiatives Program:

AFIP is moving pathology forward with the new Clinical Initiatives program. How is this agenda putting AFIP at the top? By joining hands with academia, government institutions, and private companies. By developing new technologies that raise the bar of medical research. And by maintaining our position as a leading institution for pathology consultation, education, and research.

Established in 2007 and spearheaded by COL Glenn Sandberg, the Clinical Initiatives program has been on the move. Representatives of AFIP are heading to conferences and meetings all over the world, promoting new practices and techniques while showcasing breakthrough research. Expanded efforts to update molecular diagnostics resulted in new state-of-the-art laboratories.

New Coalitions

By reaching out to other institutions, AFIP continues to make itself known. Now, AFIP is in partnership with Walter Reed Army Medical Center for studies on gynecological and colon cancer. The Uniformed Services University of the Health Sciences' Department of Pediatrics is collaborating with AFIP to further research efforts. Baylor University is using our repository for tests targeting drug therapy on brain tumor tissue. Work done in Biophysics is being funded by the National Institute of Health, the National Cancer Institute, and Veterans Affairs. And a new alliance with a pharmaceutical company for the study of brain cancer is the latest way AFIP is making one-of-a-kind research known.

New Tissue Microarray Program

AFIP has advanced new techniques for creating tissue slides containing 500 to 1,000 cores from multiple tissue blocks. This allows researchers to learn more about a given disease more effectively in less time, and it means the samples are kept intact for future use. Now with this new program, AFIP can expand its research and make available samples to other institutions. With a repository containing case files from the early 1900s through today and with some of the most unique tumors ever collected, our resources are unparalleled.

"We have something everybody needs. A better way of pathology."

— COL Glenn Sandberg



New Techniques

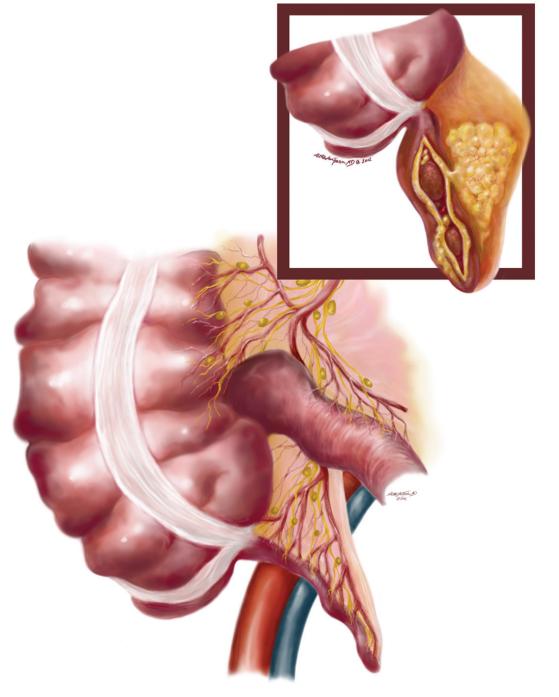
Dr. Wei-Sing Chu, Chief of the Immunohistochemistry Laboratory, has developed a novel non-destructive technique for DNA/RNA extraction that is the first of its kind. Using molecular technology, the technique leaves the tissue intact for staining and future study. Through a collaboration with U.S. Army's Medical Research Institute for Infectious Diseases, a study of RNA extraction from formalin-fixed, paraffin-embedded tissue has shown successful results.

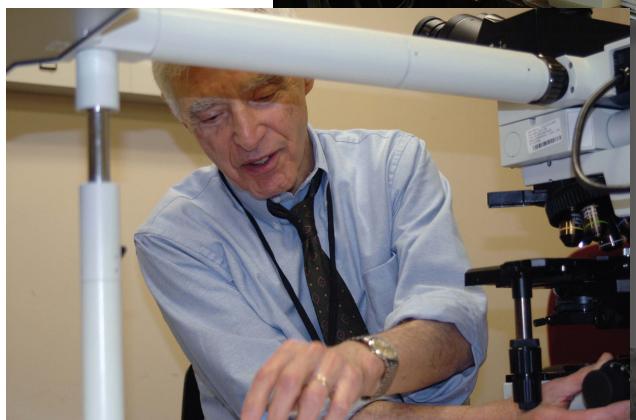
The Division of Biophysics, headed by Jeffrey T. Mason, PhD, developed the most sensitive test in the world for detection of botulinum neurotoxin—a potential bioterrorist agent. This invention is critical for homeland security as well as clinical analysis. Another recently publicized finding from the Division of Biophysics is a method to reverse the effects of formalin fixation—a tissue preservative. Historically, tissues preserved in formalin were harder to analyze, but now with AFIP's new techniques, researchers unlock more of the DNA and RNA proteins present in tissue. This discovery has been published and will soon be a standard practice in medical research.



New Labs

AFIP's molecular diagnostic laboratory has just been updated with top-of-the-line technology. Robotic stainers allow technicians to spend less time at the bench cutting samples, while limiting exposure to potentially dangerous chemicals. New cover slippers mean reduced turnaround time for specimen analysis (24 to 48 hours). Magnetic resonance microscopy is being used to study bone mineralization, bone implants, traumatic brain injury, prostate cancer, and forensic specimens.







CREATIVE CONSISTENT CONSULTATION COLLABORATIVE COMMITTED

Advanced techniques. Revolutionary guidance. Current knowledge.

AFIP's consultation effort isn't simply a helping hand. It means clients are getting the best answers from prominent pathology officials. In 2007 alone, AFIP received over 50,000 consultation requests. The standards of AFIP staff are unsurpassed by any other pathology organization. AFIP was the first to incorporate the most advanced techniques in sectioning, staining, gold labeling and other methods for processing tissues. The personnel are on the leading edge in the development of ground-breaking programs such as telepathology, gene studies, and imaging techniques.

AFIP wants the pathology community to grow. Progressive programs, such as telemedicine, ensure that expert guidance can reach out to remote areas. AFIP staff are on the move across the world giving their guidance to those who need it. As new technology and techniques are developed, AFIP will become even more resourceful, modernizing the medical community.



AFIP Studies the “Baghdad Boil”

The U.S. Military in the Mideast know to watch out for the sand fly. They are small enough to pass through the mosquito netting, and they carry something far worse than just irritation. Cutaneous Leishmaniasis, also known as the Baghdad Boil, is caused by the sand fly-borne parasite. Not only can it take up to a year to heal but the lesions can cause scarring and loss of joint mobility. Clearly this was something much more serious than a simple bite. More and more soldiers were coming home with these boils, and the available treatment had serious side effects. AFIP's Department of Environmental and Toxicological Pathology commenced an extensive investigation to study these puzzling lesions.

AFIP set up a registry for Leishmaniasis and receives biopsies for expert diagnostic consultation. The disease is very hard to diagnose, but AFIP is equipped to handle even the most difficult cases. Since analyzing the disease, the department has made some significant findings into understanding this condition and how to treat it.



CDC Asks AFIP to Help Unravel Mysterious Illness

Reports of a mysterious skin rash started cropping up in the U.S., Canada, Australia, and several European countries in 2007. The disease, called Morgellons after a 17th century medical paper describing similar symptoms, was becoming a serious concern for Centers for Disease Control. As more people started coming to the doctors with skin rashes and sores with abnormal skin sensations (crawling, biting, and stinging), the CDC knew it was time to bring in the experts. The CDC chose AFIP, with its top facilities and renowned pathologists, to be a helping hand in analyzing the mysterious Morgellons.

AFIP is launching into a comprehensive study with the aid of Kaiser Permanente's Division of Research. The ongoing study will examine skin biopsies and fiber specimens using routine light microscopy, led by Michael Lewin-Smith, MD, Chief of AFIP's Division of Environmental Pathology. AFIP's Department of Dermatopathology will participate in the light microscopic evaluation of skin biopsy slides. This dual effort of AFIP's esteemed departments is expected to give the Centers for Disease Control the informed answers they need.

Armed Forces Medical Examiner System

The AFIP's Armed Forces Medical Examiner System (AFMES) is safeguarding soldiers with its innovative work. The commitment of AFMES to fully account for every military member who died while in service to their country meant that in 2007 over 1000 deaths were investigated.



Results from these forensic autopsies were used to improve protection on the battlefield. Using the analysis of wound patterns, AFMES works with the program managers for both personal protective equipment and military vehicles to improve survivability. These efforts, funded through the Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC) program, ensure that the lessons learned from the fallen are incorporated into the equipment of the future.

Department of Veterinary Pathology—Spreading Knowledge Through Consultation

The Department of Veterinary Pathology is protecting the health and stability of captive and wild marine mammals. Working with the National Marine Fisheries Service (NMFS), AFIP's veterinarians provide diagnostic support to about 200 marine mammal cases each year. Bottlenose dolphins, California sea lions and highly endangered species such as the Northern right whale and the Hawaiian monk seal are helped by AFIP's expert diagnoses. Michelle Fleetwood, DVM, is the AFIP representative consulting with the NMFS on significant marine animal research. When an unusual mortality event is occurring (such as a mass death of bottlenose dolphins), AFIP works with the NMFS to respond to these events to find the problem.

The numerous projects with NMFS showcase AFIP's top-notch consultation. In 2007 alone,

AFIP studied deaths of California blue whales, strandings of Guadalupe fur seals in the Pacific Northwest, cetacean mortalities along the coast of central and southern California, and strandings of the endangered West Indian manatee in the Southeast. The research done with the NMFS also has an educational aspect—these cases provide a valuable learning opportunity for the DoD Veterinary Pathology Residents, especially due to the high level of infectious diseases in these species.

At the Northeastern Veterinary Pathology Conference, AFIP's MAJ Eric Lombardini presented a case of leptospirosis of an elephant seal, and discussed precautions necessary to be taken in rehabilitation facilities to prevent spread of this zoonotic disease. MAJ Christine Christensen presented a case of a peripheral nerve sheath tumor in a pygmy killer whale. This new finding is the first report of a peripheral nerve sheath tumor in the adrenal gland of a cetacean. AFIP's esteemed experts making significant strides at prestigious organizations.



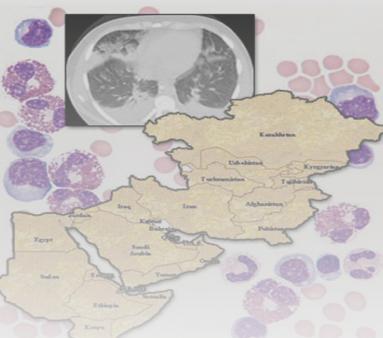
Acute Eosinophilic Pneumonia

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Armed Forces Institute of Pathology

Acute Eosinophilic Pneumonia

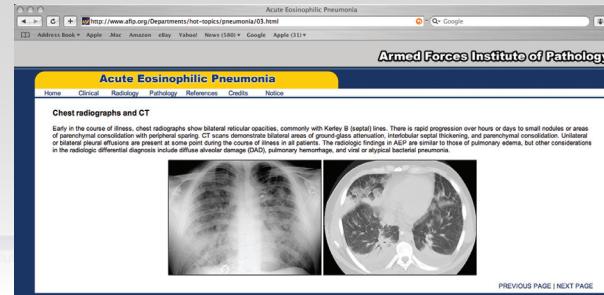
Home Clinical Radiology Pathology References Credits Notice



Acute eosinophilic pneumonia, an acute febrile illness that can result in life-threatening respiratory failure, has been reported among US military personnel deployed to the Central Command Area of Responsibility. This website outlines the clinical presentation and diagnosis of this disorder, and is a collaborative effort of the Armed Forces Institute of Pathology, the American Registry of Pathology, and Walter Reed Army Medical Center, Washington, DC, USA, and Landstuhl Regional Medical Center, Landstuhl, Germany.

A complete list of those responsible for the content of this site is available on the [Credits](#) page.

Teri J. Franks, MD
Chairman
Department of Pulmonary and Mediastinal Pathology
Armed Forces Institute of Pathology



Acute Eosinophilic Pneumonia

Home Clinical Radiology Pathology References Credits Notice

Chest radiographs and CT

Early in the course of illness, chest radiographs show bilateral reticular opacities, commonly with Kerley B (spetal) lines. There is rapid progression over hours or days to small nodules or areas of confluent infiltrates, and then to large confluent areas of pulmonary edema, hemorrhaging, and parenchymal consolidation. Unilateral or bilateral pleural effusions are present at some point during the course of illness in all patients. The radiologic findings in AEP are similar to those of pulmonary edema, but other considerations in the radiologic differential diagnosis include diffuse alveolar damage (DAD), pulmonary hemorrhage, and viral or atypical bacterial pneumonia.

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AskAFIP™

Department of Pulmonary and Mediastinal Pathology - Armed Forces Institute of Pathology

In Iraq, numerous soldiers have come to doctors with skin lesions. Doctors are scratching their heads and fear these lesions could be threatening if left untreated. Confined to a desolate area with no medical education resources for miles, doctors need to get help with diagnosis.

In Uganda, a doctor in a village has come across a peculiar case. A man comes in with a rash that looks to be a result of a parasite. The doctor needs some more information to determine how to treat him.

On a military base, an Army veterinarian has a sick working dog. He needs to figure this problem out before it gets serious.

What resource will be able to help? AskAFIP™. The newest, high-tech online resource that gets answers straight from the experts at AFIP. The web portal provides diagnostic answers and information through its virtual library. AskAFIP™ incorporates the latest pathology medical books, case repositories, and articles to create an endless resource for those who need answers fast. High resolution images allow viewing tissue samples up close. Informative streaming video details the new treatment practices for specific and complex cases. Entire publications are uploaded on the website and downloadable with a click of a mouse. The library is constantly updated, new cases and procedures are added daily, and the resource is reaching pathologists worldwide.

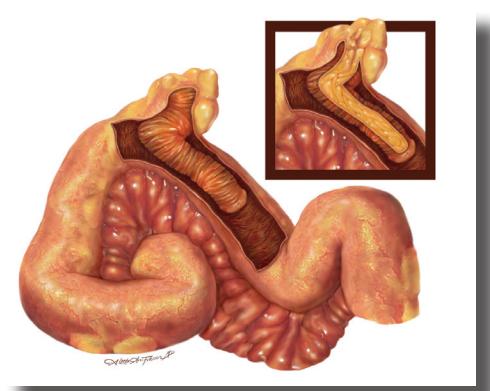
What's in the Virtual Library?

Cases from AFIP's digital case repository with virtual slides. With a selection of millions of rare case files, AskAFIP™ is available to military organizations and other researchers worldwide.

AFIP/ARP Atlases of Tumor and Nontumor Pathology and the Radiologic Pathology Course Syllabus. Featuring current information and research, the publications are used to teach pathologists and clinicians as well as medical students.

Articles published by members of AFIP Staff. AFIP's renowned pathologists and medical staff have been featured hundreds in *American Journal of Surgical Pathology*, *Human Pathology*, *Veterinary Pathology*, *Radiographics* and toxicology journals.

Video of new techniques and practices. Detailed instruction on video shows off the proper way to treat certain infections and diseases.



Telemedicine Goes Global—AFIP Makes Trek to Modernize Telepathology

The future of medicine is now brought to Baghdad. The Department of Telemedicine and Distance Learning's Bruce Williams, DVM, and Daniel Butler went to the 10th Combat Support Hospital (CSH) in the International Zone to add a pivotal piece of new technology. A digital slide maker that produces virtual slides, and a telepathology system that makes interaction with outside medical experts available in seconds. Now, immediate diagnosing from expert consultants is available to the CSH in Baghdad. With AFIP's help, wounded soldiers can get treated faster.

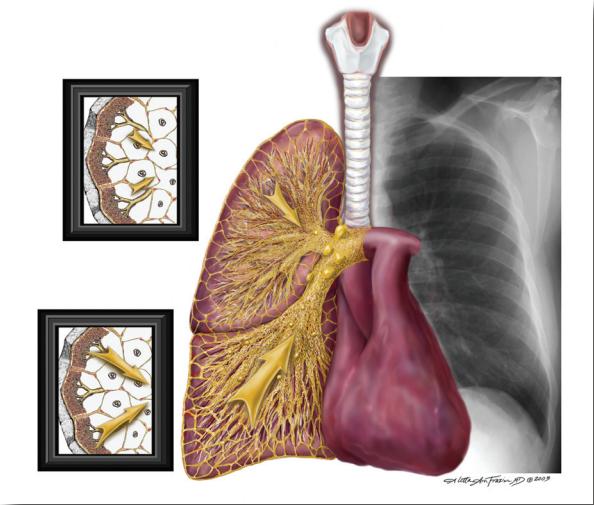
What exactly is a digital slide maker? AFIP chose the Trestle Corporation's Digital Slide Maker (DSM) system after a competitive bidding period to equip the military. With the high-tech DSM, pathologists can view virtual slides, thousands of miles away from the patient, at magnifications up to 400x. The scanner puts the virtual slides online for AFIP's experts, and gives knowledgeable advice on the next steps for the doctors in Baghdad. AFIP's efficient use of newer technology is directly empowering the military, and saving lives.

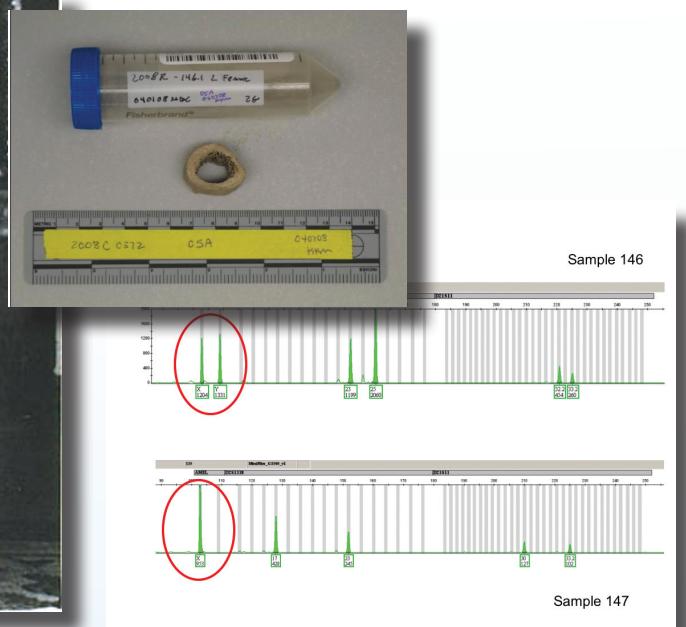




Divers in Greece Discover Remains Deep Within a Cave

Three sets of bones are taken ashore and analyzed. Thirty years before, a U.S. Air Force sergeant, an airman, and her brother went missing while exploring the underwater caves in Greece. Because AFIP has one of the most experienced DNA labs in the world, the Greek government sent the remains to AFIP, on the chance that these bones might be those of the missing individuals. Through mitochondrial DNA sequencing to match the deceased with samples provided by family members, AFIP discovered that the bones were indeed those of the missing Americans. AFIP's first-class investigation resulted in the Air Force sergeant, the airman, and her brother finally being laid to rest in the summer of 2007.





AFDIL Helps Identify Remaining Members of Romanov Family

"First, we were able to help Russian scientists by finally bringing closure to the mystery of the Romanov family remains. And secondly, our scientific staff gained valuable experience with highly degraded remains—experience that will ultimately help us continue to successfully identify the remains of U.S. service-members killed in World War I, World II, Korea, and Vietnam."

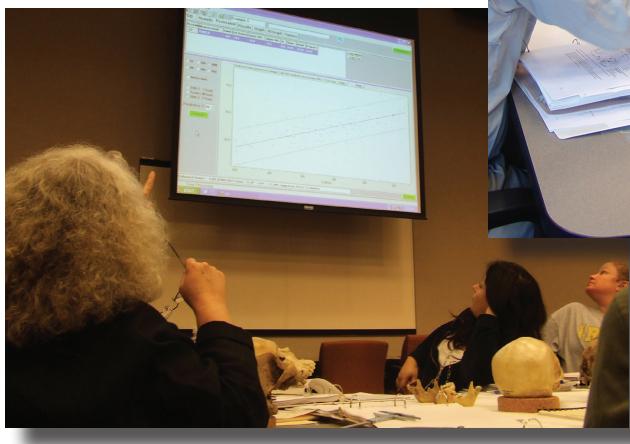
—LTC Louis Finelli, MC, USA,
Director, Armed Forces DNA
Identification Laboratory

In 1995, AFIP's Armed Forces DNA Identification Laboratory (AFDIL) helped the Russian government to confirm the forensic DNA testing of Tsar Nicholas II by comparing his mitochondrial DNA (mtDNA) type to his brother, Grand Duke Georgij Romanov. The Tsar, Tsarina Alexandra, and their five children (along with four loyal servants) were executed the night of 16–17 July, 1918, in Yekaterinburg as part of the Bolshevik revolution. Adding intrigue to the mystery, when the mass grave containing the skeletal remains was exhumed in 1991, two sets of remains from the Romanov children were missing. Conspiracy theories continued to grow that perhaps these two children survived the bullets of their executioners and somehow made their way out of Russia.

Several women have claimed to be Anastasia, the most famous of whom was Anna Anderson Manahan from Charlottesville, VA. Anderson's body was cremated upon her death in 1984. In 1994, AFDIL conducted DNA testing on a biopsy specimen of Anderson's that had been taken during a medical procedure and stored at the University of Virginia Medical Center in Charlottesville. The DNA tests showed that Anderson's DNA did not match the Romanov remains or Prince Philip, Duke of Edinburgh, a relative of the Romanovs.

So in June of 2007, when amateur Russian archeologists discovered another grave site—roughly 70 meters away from the first grave—investigators believed the missing remains of the last two previously unidentified children would soon be resolved. It was only natural that Russian investigators would once again turn to AFDIL for their expertise.

After months of work, both outside and in AFDIL's famed laboratories, AFDIL researchers and DNA technicians were able to produce indisputable results. Using a combination of mtDNA analysis, nuclear DNA testing, and Y-STR (Short Tandem Repeat) testing, AFDIL analysts were able to conclusively show that the remains of the two children—one male and one female—were direct descendants of the Tsar and Tsarina, and that they were directly related to the other previously identified siblings.





EXCEL EVOLVING EDUCATION EFFECTIVE ESTEEMED

0.08%

What does this number mean?

It's what makes AFIP one of the most prestigious educational institutes in the world.

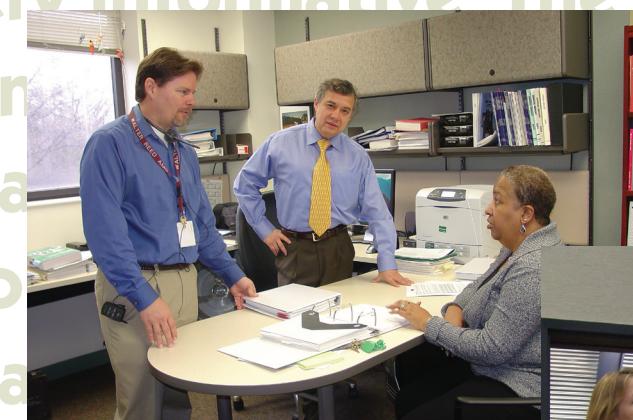
It's why distinguished military and civilian medical personnel turn to AFIP to continue their medical education.

Of all the CME providers in the nation, only **0.08%** receive a 6-year accreditation from the Accreditation Council for Continuing Medical Education (ACCME). This rare achievement was recently awarded to AFIP's Department of Medical Education. It's no surprise for a department that is used to reaching such high standards of education, but it is an exceptional feat. Couple that with having been awarded 5 commendations, and you've got an institution that lives up to its acclaimed reputation.

World-leading military and civilian doctors turn to AFIP for the latest advances and most complex diagnostic cases in pathology. Physicians, nurses, radiologists, and sub-specialty clinicians trust AFIP to teach the most current techniques and findings. And with a 6-year accreditation, their trust is founded.

Excellent course*Dr. Sassani did a good job of reviewing histopath*Dr.'s Lloyd, Burnier and Shields lectures were outstanding*Overall, great course, amazing speakers*Handouts on

CDs was an excellent choice*The glass slides are a winning combination*And excellent list of topics*All presentations were excellent and extremely useful*AFIP in the world; practical, truthful, useful, very informative*The labs served as an excellent opportunity to see and understand all the info we



"AFIP's goal is to provide as many multi-format CME courses as possible because we believe this will best serve the needs of our physician learners, particularly those in the military."

**—Mr. Carlos Moran, MS
Chair, Department of Medical Education**



Veterinary Pathology Education Reaches New Levels of Success

The Department of Veterinary Pathology had numerous new education classes this year. AFIP's Veterinary Pathology residents pass board certification at a higher rate than residents from other institutions, qualifying them to join DoD biomedical research organizations. By expanding the Veterinary Systemic Pathology online program, the department is becoming even more valuable to fellow veterinarians and students. Available free to military medical professionals, the online program is a resource that combines case manuscripts with digital photomicrographs and virtual slides of more than 675 disease entities, including most of the high-consequence zoonotic and foreign animal diseases of importance in the Global War on Terror. The Department of Veterinary Pathology also conducted a 25-week histopathology slide conference with 135 participating institutions in 22 countries. The conference had an enormous impact on training programs and on hundreds of veterinary pathologists and residents worldwide.

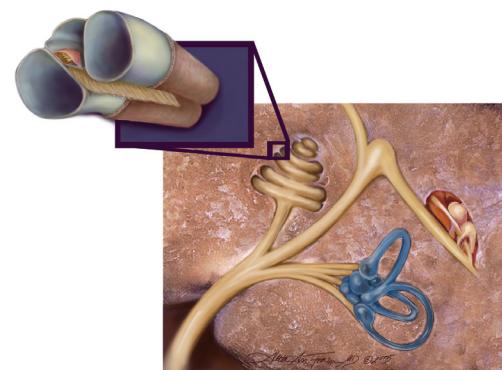
Continuing to have an impact with the Department of Education Continuing Medical Education classes, two courses received outstanding attendance and feedback, while tackling important issues surrounding the veterinary pathology world.

Descriptive Veterinary Pathology:

One of AFIP's popular education courses aims to increase students' skills at describing gross and microscopic lesions in numerous animal species. AFIP's staff of veterinary pathologists give lectures on interpreting electron micrographs and immunohistochemical preparations; the correlation of gross, microscopic, cytologic, and clinicopathologic data; and a review of basic molecular techniques. Digital images from AFIP's large repository are used to demonstrate gross lesions in a variety of major organs of animals. This course covers all the basics of veterinary pathology, and continues to be an important course to attend.

Pathology of Laboratory Animals:

This AFIP course is one of the most attended veterinary laboratory courses in the nation, with students attending from all over the world. The course focuses on the interpretation of spontaneous diseases which might affect experimental results or alter the health of laboratory animals. The wide range of diseases covered includes infectious, neoplastic, iatrogenic, nutritional, and metabolic conditions of a variety of animal species making this one of the most important courses of its kind.



AFIP's Modern Education Teaches Today's Top Minds

This year marks a new wave of Continuing Medical Education courses to stimulate the minds of established doctors and medical students alike. Here are just a few highlights from the AFIP's educational program.

Hot Topics:

Started as a response to the anthrax scare in 2001, Hot Topics extends AFIP's expertise in recent issues raising medical concern. The initial Hot Topic on anthrax resulted in thousands of hits on AFIP's website. The site is continually updated with new medical information. Each Hot Topic covers the pathogenesis, histology, diagnosis, and imaging of disease.

Neuroradiology:

AFIP traveled to Denver, CO, to give a 2-day-long course offering radiologists, neurologists, neurosurgeons, and pathologists updated techniques and topics. The physics of MRI and advanced imaging were discussed with students and lectures were held on unknown cases and infectious diseases. In its 24th year, this course continues to be a successful way in which AFIP keeps today's physicians up to date in neuroradiology.

Gastrointestinal and Hepatic Pathology:

This course reviews commonly encountered problems involving hepatitis, infectious diseases, toxic injury, cholestasis, developmental and metabolic liver diseases, and neoplasms. These are thoroughly analyzed to provide doctors and students knowledge to make a correct diagnosis. Drawing from over 300 case files in AFIP's wide-ranging database, the participants of the course gain knowledge and perfect their techniques.

Forensic Anthropology:

AFIP's newest education course is bringing pathology to the crime scene. Forensic Anthropology, a new arm of pathology, is the scientific recovery of human remains in the medicolegal context. Victim identification plays a big part in resolving human rights investigations and mass disaster operations, and AFIP's course trains doctors in this unique science. The course uses hands-on lab sessions to teach pathologists techniques of skeletal analysis and includes lectures on human osteology.





Anatomic Pathology Course is Most Attended Prestigious CME Course

AFIP's most widely attended course is known internationally as a fundamental resource for Continuing Medical Education and for Anatomic Pathology Board preparation. This impressive course covers generalized and specialized areas of Anatomic Pathology. World renowned experts from all of AFIP's many departments teach almost 150 students coming from all over the U.S. as well as Asia, Australia, New Zealand, Europe and Africa. The AFIP Anatomic Pathology Course lasts 6 days and is an intensive course in inflammatory, infectious, and tumor-related diseases. It is a comprehensive update and review course. Reviewing all fields in surgical pathology, cytology, and forensics, the course is taught by internationally recognized AFIP pathologists in every subspecialty who have vast experience in international consultation, large research studies, and international teaching.



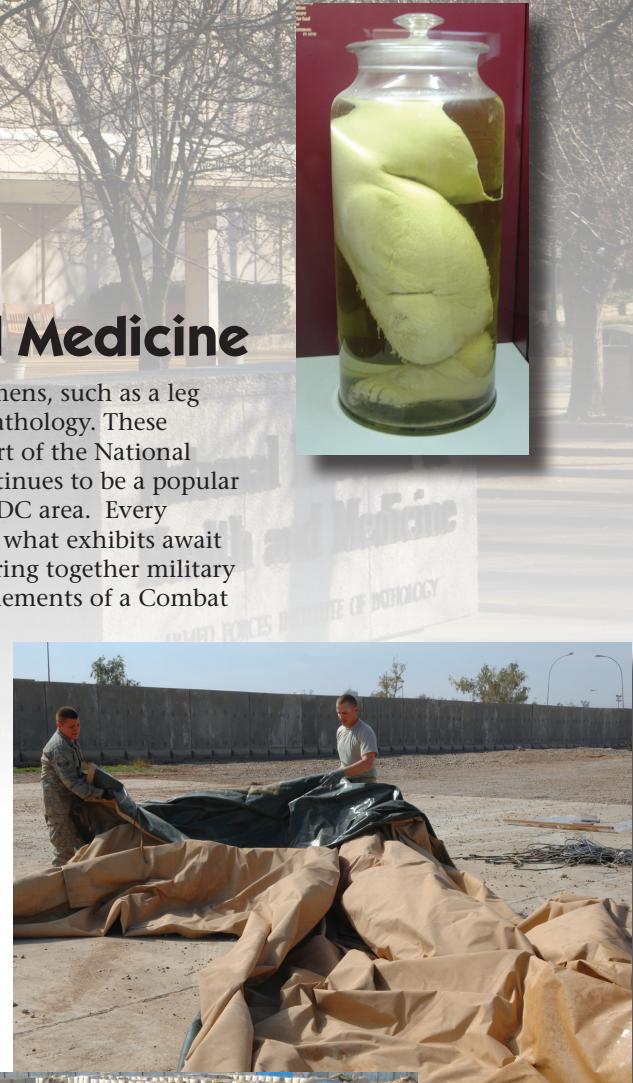
Unique to this Anatomic Pathology course are the 500-600 cases that the participants get to review. These slides are chosen from the AFIP's incredible collection of archival material dating back to 1916, a collection continually reviewed and renewed by the AFIP's experts. Participants can review classic and complex anatomic pathology slides and test themselves on the diagnoses during the course.

The course is attended by senior residents and general practicing pathologists from all over the world. The AFIP Anatomic Pathology course has exemplary teaching, and is known in the medical community as a resource when studying for the Anatomic Pathology Boards as well as for approaching common and difficult cases for general pathologists. New techniques this year include fluorescence in situ hybridization (FISH) markers in soft tissue pathology.

National Museum of Health and Medicine

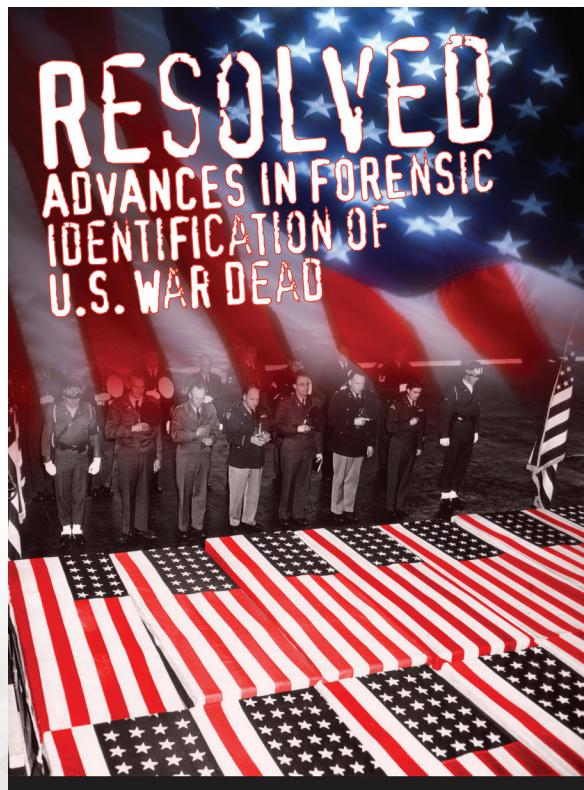
The bullet that ended President Lincoln's life. Preserved human specimens, such as a leg infected with elephantiasis, along with numerous other examples of pathology. These items, along with 24 million artifacts housed in five collections, are part of the National Museum of Health and Medicine. AFIP is proud that the Museum continues to be a popular destination for scholars and a historical landmark in the Washington, DC area. Every day, students, tourists and curious minds alike visit the museum to see what exhibits await them. This year, NMHM is committed to opening new exhibits that bring together military and civilian medicine, as well as art, culture, and education. Such as elements of a Combat Support Hospital (CSH) unit flown in from Iraq. Or a multimedia presentation that explores the dynamic community in Carville, Louisiana that, with the help of dedicated researchers and patients, resulted in a treatment for leprosy that is still in use today. Here are a few examples of exhibits available to visitors today:

Balad CSH (Combat Support Hospital) Unit: A CSH unit is an emergency room established in the heart of a battlefield to save lives, and now elements of a CSH from the current conflict in Iraq will be on display at the NMHM. The installation will feature the concrete floor of the emergency room from the Air Force Theater Hospital in Balad, Iraq, along with the surrounding tent, medical equipment and material. The floor, weighing in at nearly three thousand pounds is known as "Bay II," and was where the most critically injured American servicemembers were treated between 2004 and 2007. Visitors to the museum will see how a modern battlefield hospital works to save lives.



"RESOLVED: Advances in the Forensic Identification of US War Dead": This new exhibit features, in part, DNA research for the military led by AFIP. The scientific progress in identifying remains has changed significantly over the years with the help of AFIP, and the "RESOLVED" exhibition describes the evolution of forensic sciences. From the introduction of dog tags to the use of DNA analysis, all pieces of the puzzle are on display.

"Triumph at Carville: A Tale of Leprosy in America": Coinciding with the spring 2008 premiere of a PBS documentary of the same name, "Carville" tells the story of the nation's only leprosarium established more than 100 years ago in Carville, Louisiana. Leprosy patients from all over the world were sent to Carville for treatment and rehabilitation, sometimes for the remainder of their lives. The exhibit expands the story told in the documentary with artifacts and objects that illustrate the rich cultural and social life the patients fostered for themselves while quarantined at Carville.



Brain Awareness Week 2008: Prominent neuroscientists from George Washington, Howard, and Rutgers Universities, as well as the National Institutes of Health engaged students in an enlightening series of lectures and hands-on activities designed to allow the students see, touch and learn about the human brain. Done in collaboration with Dana Alliance for Brain Initiatives, the five-day celebration was a great success. In 2009, NMHM will celebrate the tenth anniversary of its Brain Awareness Week activities.

"Jennifer Jako: Young and Positive, Living with HIV": NMHM featured HIV/AIDS activist and documentary filmmaker Jennifer Jako, who shared her personal story as well as screened her documentary "True Life: It Could Be You." The program tied together personal stories and the science of the disease, and was related to another temporary exhibit at NMHM, "Gregor Mendel: Planting the Seeds of Genetics."







RENNED RESOURCEFUL RESEARCH RESULTS REACHING OUT

A glance around the research facilities at AFIP is witnessing the evolution of medicine. High-tech laboratories and a new virtual repository system are just a few ways AFIP research is looking ahead.

In a repository housing over 7.1 million case files, AFIP maintains and analyzes this wealth of information. The Victor J. Ferrans Virtual Repository makes AFIP's resources efficiently available to those who need it.

Findings from ground-breaking research in basic science, environmental pathology and toxicology, geographic and infectious disease pathology, oncology, molecular diagnostics, and forensic science consistently put AFIP on the map. Now with state-of-the-art laboratory equipment, increased staffing, and modernized renovations, the research done at AFIP only gets better with time.

AFIP's Newest Research Project—Traumatic Brain Injury

Shock from battlefield explosions may result in debilitating brain injuries, affecting many soldiers coming home from their tours. Nonfatal injuries may show no signs of trauma at all. Yet life-altering symptoms (including Post Traumatic Stress Disorder) can crop up days, months, or even years after a tour, and have effects that last a lifetime. Brain injuries from blasts are inhibiting soldiers from continuing on with service, careers, or in some cases, normal functions of everyday lives. AFIP is starting a new research program that goes deep into this issue—and deep into the brain.

Recently AFIP gained the expertise of Dr. Vernon Armbrustmacher, former Director of AFIP and a leading neuropathology expert, to get involved in this new project. The Traumatic Brain Injury Research project explores the correlations of a blast in battle and brain damage. By discovering the brain mechanisms behind the illness, the AFIP is learning ways to possibly ameliorate these effects.

Not only will new state-of-the-art laboratories at AFIP allow for very complex stains, a repository containing millions of samples allows for comparisons with other brain tissue dating back to the Civil War. This project will create a database of knowledge that will be a platform for a continued research.

"If you can demonstrate the problem is due to damage, then you can strategize what's causing it, interrupt it and how to prevent it."

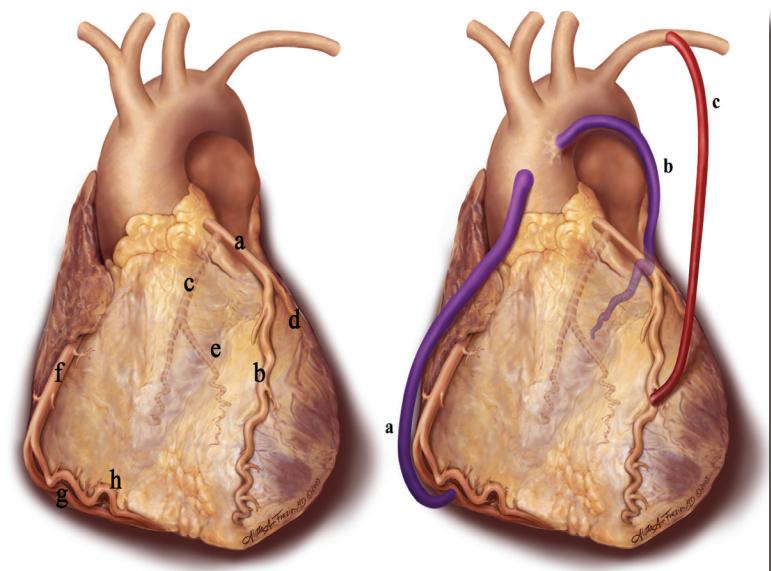
—Dr. Vernon Armbrustmacher





AFIP's Research Results in Stronger DoD Health Affairs Policy for Soldiers

Improvised device weaponry in the battlefield can discharge many fragments upon explosion, resulting in metal alloys embedded in wounded soldiers. AFIP's Department of Environmental and Infectious Disease Sciences has established a registry program on chemical characterization and case material on metal fragments and other foreign materials removed from surviving servicemembers. The establishment of this registry on Embedded Metal Fragments is in response to the recently approved DoD Health Affairs Policy. The new policy recognizes that some munitions may contain certain tungsten alloys and other metals that may pose a long-term toxicological hazard when retained in the human body. The AFIP has been asked by DoD Health Affairs to serve as one of three DoD sites for the analysis and archiving of fragments removed from DoD personnel. This important research project betters the clinical care of our soldiers, as well as furthering the study of the effects of metal alloys.

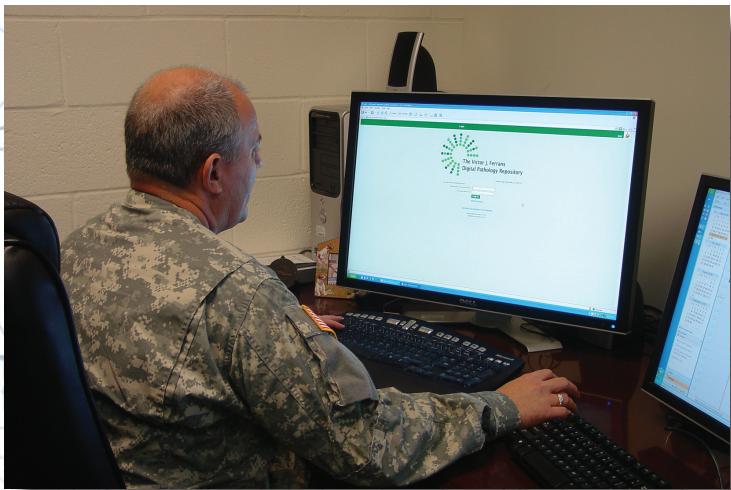
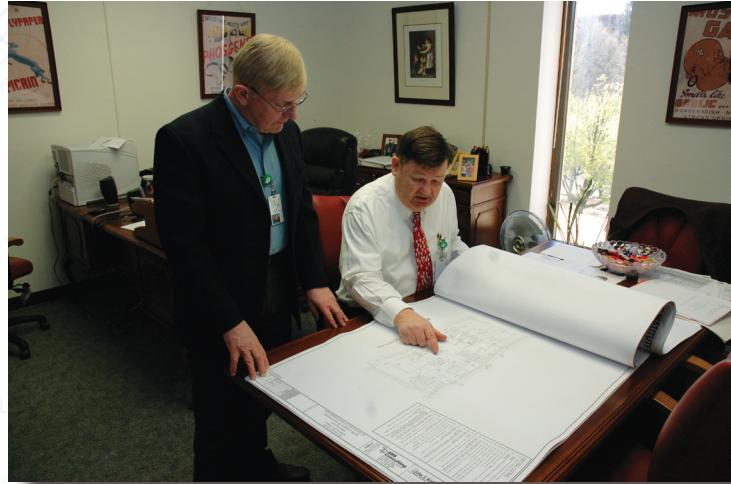


New Repository Building Holds AFIP's Biggest Resource

AFIP's tissue repository is getting a new home with the construction of Building 606. The building will be state-of-the-art storage for one of the most significant collections for medical use today. This new 55,000 square foot facility has enough room to hold AFIP's 24 million paraffin-embedded tissue blocks, 44 million glass slides, and 3.5 million wet-tissue samples. The collections hold some of the most unique and complex medical cases. The building contains new safety features that protect the collection for future medical research projects. It will make it easier and more efficient to use the collection in AFIP's consultation, education, and research. Upon completion, the facility will be pivotal for medical research to come.

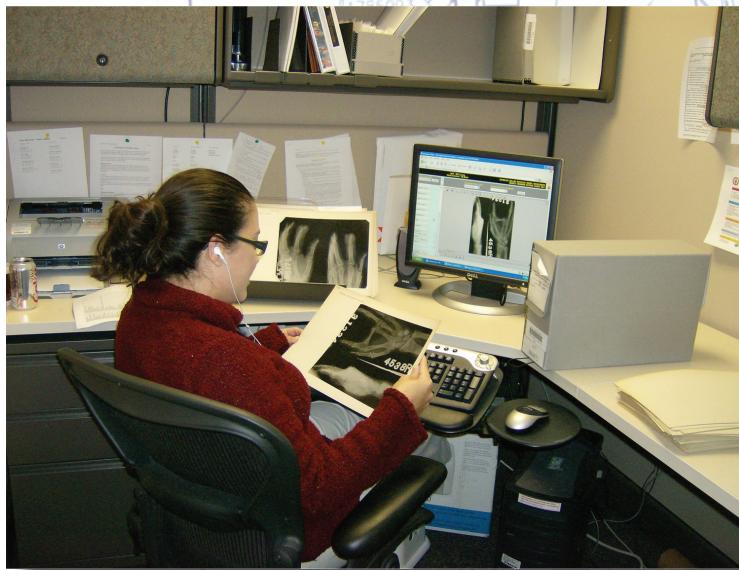
Victor J. Ferrans Virtual Repository

Imagine a storage facility containing 5.2 million cases with 31 million images. Now imagine it available at a click of a mouse. AFIP has just created a new virtual repository, allowing its complex case files to be accessible to the military and the public. This online portal, called the Victor J. Ferrans Virtual Repository, is an efficient way for doctors to view cases in AFIP's repository. Military, government, and commercial doctors can use the Virtual Repository to further their own medicinal study. This newly available website will modernize the way that AFIP's research spreads it to the worldwide medical community. Named after famed pathologist Victor J. Ferrans, a man blinded later in life but who persevered in his successful pathology career, the website mirrors Ferrans' unique ability to recall information.



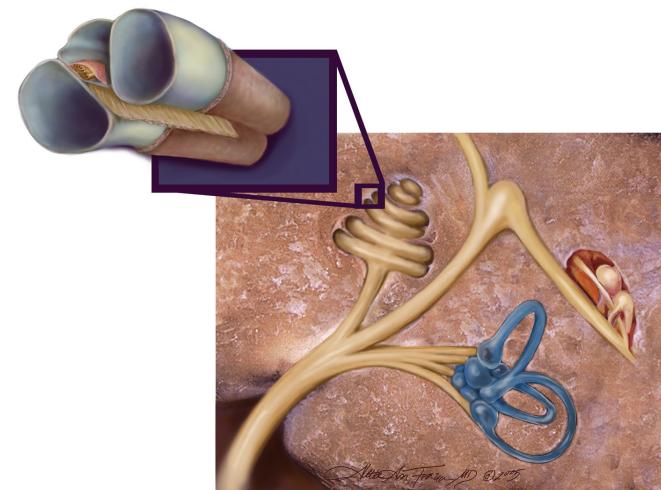
Government Digitizes AFIP Assets

In 2002, the AFIP began a project with IMC to digitize the millions of critical health records contained in its repository. This project is essential to preserving and providing access to this irreplaceable asset representing specimens and data collected by the Armed Forces dating from the Civil War Era through the present. The AFIP's objectives under this program create value by enabling the AFIP to fulfill its mission of providing pathology data internally to the AFIP users, as well as on a subscription basis to the AFIP customers. IMC's scope of services for the AFIP includes receiving, labeling, digitizing, indexing, storing, and providing hosted electronic access to medical records and historic data. The current Scanning for AFIP program provides for the development and continuing support of the Victor J. Ferrans Digital Pathology Repository, a vast, searchable computer database created from the AFIP repository that can be interrogated worldwide for unique epidemiological information in support of critical healthcare investigations, developments, and outcomes.



provide pathology related training to military and civilian physicians worldwide, providing both CME credits and valuable knowledge.

During 2008, IMC will process nearly 5 million pages of patient records, including records from the Department of Defense Tumor Registry (ACTUR), records from the Radiological Pathology Collection, and an additional 350,000 pages of historical medical records from the AFIP Medical Illustration Library (MIS)—numbers comparable to prior years. This work is performed by IMC personnel at the AFIP, at IMC's data center in Rocket Center, WV, and at IMC's conversion facility in Cowen, WV.



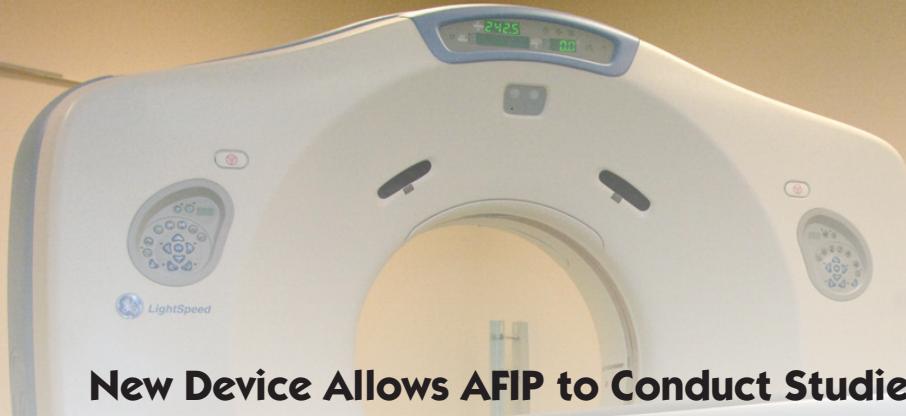
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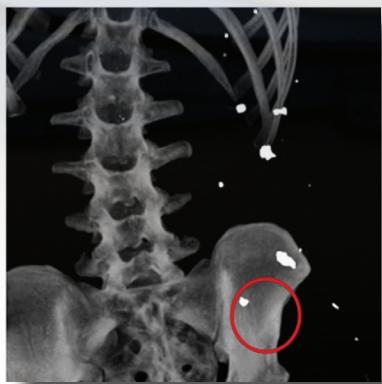
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2. A MINIMUM DISTANCE OF 30'-0" SH. MAINTAINED BETWEEN BUILDING 606 OTHER BUILDINGS OR STRUCTURES.



New Device Allows AFIP to Conduct Studies, Saving Lives on the Battlefield

The powerful tool is unrivaled by any other technology and is the only one of its kind. The first-ever forensic CT scanner, specifically designed for DoD by General Electric, produces a more detailed and efficient analysis. Where to see this innovative machine? The AFIP Office of the Armed Forces Medical Examiner (OAFME) recently acquired this machine at the Dover Port Mortuary. The machine is making research revolutionary.



OAFME's radiologists use the scanner to aid the autopsy process and to gather mortality surveillance data. Now with the forensic CT scanner, that research is conducted more efficiently. The whole body can be scanned in just around three minutes and the scanner records about 3,000 images. Autopsies can become less invasive as higher resolution images of the body pinpoint the injury.

"We're learning every day about how this technology is not only helping our pathologists in the autopsy room, but what we can achieve with the enormous amount of data being collected."

—John Getz, Program Manager and Imaging Specialist, OAFME

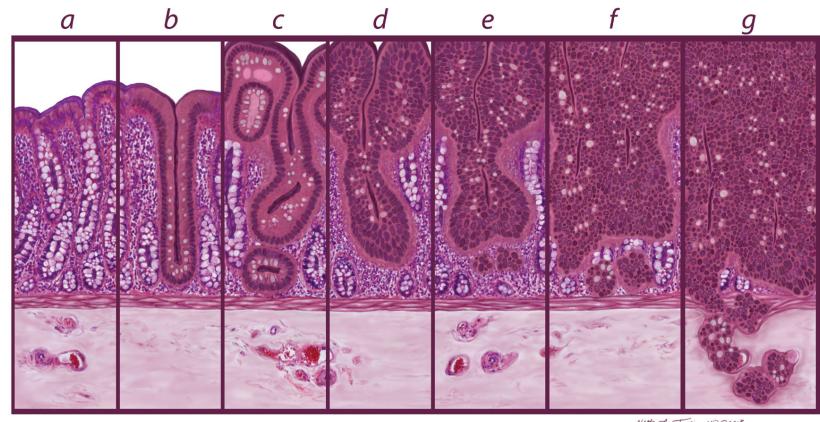
"We are able to do 3-D reconstruction of wounds and determine their pathways."

—CAPT Craig Mallak, MC, USN
Director, OAFME

Bad Seeds Produce Bad Crops—A New Theory on Tumors

Two novel hypotheses for breast tumor progression and invasion have been introduced by AFIP to the medical community. Under the leadership of Yan-gao Man, MD, PhD, Director of AFIP's Gynecologic and Breast Research Laboratory, the hypotheses have gained international recognition. Entitled "Bad Seeds Produce Bad Crops," one theory looks into focal degeneration of aged or injured myoepithelial cells and the resultant auto-immunoreactions as trigger factors for breast tumor invasion. Dr. Man also co-introduced a novel hypothesis for prostate tumor progression and invasion. The second theory goes into focal degeneration of basal cells and the resultant auto-immunoreactions as mechanisms for tumor invasion.

The two theories can be vital for the potential treatment and prevention of tumor invasion. If confirmed, they could change the concept and technical approaches for detection, intervention and prevention of tumors. These theories are just a taste of the revolutionary research at the AFIP is capable of.



Combining AFIP's Consultative Effort With Revolutionary Research

Top-rated Arsenic Research:

"This information enhances risk communication. Our research matters."

"Military medical geology is a new area of medicine developed right here at the AFIP."

—Jose A. Centeno, PhD, FRSC,
Chief, Division of Biophysical
Toxicology Dept. of Environmental
and Infectious Disease Sciences

With AFIP's Department of Environmental and Toxicologic Pathology's past and current research on arsenic, it has become an important institution for arsenic expertise and consulting. AFIP works with the Environmental Protection Agency to lower levels of harmless arsenic in drinking water. In collaboration with the U.S. Geological Society and the National Natural Science Foundation of China, AFIP conducted research on miners to discover the effects of arsenic and potential biomarkers for cancer. And now, AFIP is extending that research to cover forensic toxicology. Using modern technology AFIP determines the condition of people exposed to arsenic poisoning and then compares tissues samples with those held in the tissue repository. Additionally, AFIP is assisting DoD and other federal agencies in forensic investigations.

Depleted Uranium Research:

Conducted in association with Veteran Affairs, the depleted uranium research done with the Department of Environmental Toxicology at AFIP is one of its most significant projects. It provides the best methodology to look at exposure to depleted uranium (a component found in armor, ammunition, and medicine) as well as being a bio-surveillance program. With AFIP's research assistance, the government can monitor soldiers' exposure to depleted uranium. Found in some munitions, the effects of depleted uranium can be fatal following exposure. AFIP and the VA are conducting clinical follow-up trials of servicemembers who have been exposed. This one-of-a-kind study enables better diagnosis of exposure while helping the military discover how to ameliorate the effects. The tissue samples taken from servicemembers are analyzed in AFIP's high-tech laboratories, and then kept in the repository for future research.

Medical Geology Registry:

It's map-making for the military medical world. In conjunction with the U.S. Geological Survey, AFIP is developing a medical geology registry. This registry studies the potential impact of natural, geologic, and environmental factors on the development of disease. Thus AFIP can map out areas that could potentially expose military personnel to potential hazards. The registry at AFIP will provide real-time information to geographical health. One example of this is research done on desert dust. Due to recent concern over traveling toxic dust clouds, the AFIP's laboratories are conducting a study using dust samples, tissues of soldiers and animals that may have been exposed to dust toxins. This project, paired with additional geological data, potentially creates a new field of medicine.



Universities/Medical Schools/Hospitals:

Johns Hopkins Hospital
University of Maryland
Georgetown University
Harvard University
Mayo Clinic
Children's National Medical Center
Georgetown University
Columbia University
University of Pennsylvania
University of Michigan
University of Cincinnati
University of Washington
University of California, Lawrence Livermore
Temple University
University of Kansas
Loyola University
Carilion Medical Center

Organizations:

Henry M. Jackson Foundation
Charles Louis Davis DVM Foundation
TRUE Research Foundation
The Peace Corps Office of Inspector General
American Red Cross

Government Institutions:

U.S. Department of State
Naval Health Research Center, Silver Spring
National Aeronautics and Space Administration
Uniformed Services University of the Health Sciences
The National Capital Consortium
National Marine Fisheries Service
World Health Organization
Center for Disease Control and Prevention
National Zoological Park
Department of Veterans Affairs
Department of Defense Health Affairs
National Institutes of Health

AFIP's Alliances

Broadening outreach, AFIP is extending its knowledge to establishments all over the world to make the medical community stronger. Hospitals, universities, organizations, companies and government institutions benefit greatly from AFIP's consultation, education and research. Recently, here's who is profiting from AFIP's range of services.

Industry:

NanoVircides Inc.
Calabrant Systems
Bristol-Meyers Squibb
Pharmaceutical Research Institute
GlaxoSmithKline
Novartis Pharmaceuticals



Who does AFIP's Consultation, Education and Research Help?

The Military

Since the Civil War, AFIP has been ensuring the safety of our troops in combat.

- Every wartime fatality is carefully analyzed by high-tech medical machinery at the Office of the Medical Examiner and complex cases are stored at AFIP's large tissue repository for further study.
- The Traumatic Brain Injury research is discovering how to prevent brain injury due to shock blasts.
- The Department of Education courses are keeping military doctors up-to-date on current techniques and practices, while military medical students use AskAFIP™ as a significant resource.
- Via our telemedicine program, doctors in the war zone are getting expert medical consultation at times of greatest need.
- Research on Cutaneous Leishmaniasis and Morgellons is leading to prevention of disease during wartime. Research into bioterrorism has made significant strides.

The Medical Community

- The 7.1 million case file tissue repository puts AFIP at the forefront of significant collaboration within the medical community.
- Universities, government institutions, non-profit organizations, private companies, and hospitals are just a few of the establishments that consider AFIP important to their own medical study.
- Research has resulted in non-destructive techniques for DNA/RNA extraction as well as techniques to prevent formalin fixation.
- Private doctors and university medical students use our education classes in their own course of study.

Armed Forces Institute of Pathology

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Medical Education — 202-782-2637
Toll-free Tel: (800) 577-3749 (in US)
Toll-free Fax: (800) 441-0094 (international)
Case Accessions — 202-782-1630
Medical Information Release — 202-782-2424
Public Affairs — 202-782-2115
American Registry of Pathology — 202-782-2102
Military Personnel — 202-782-2526
National Museum of Health and Medicine — 202-782-2200
Legal Counsel — 202-782-2124

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Robert F. Karnei, MD
Former Director, AFIP

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of Pathology

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